Proposal # 2001- K-209 (Office Use Only)

A. COVER SHEET

Proposal Title: Estimating the abundance of Sacramento River juvenile winter chinook salmon with comoarisons to adult escapement.

Applicant Name: Northern Central Valley Fish and Wildlife Office

Primary Contact: James *G.* Smith
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Amount of funding requested: for tasks **1&2 $345,808** year **1;** 359,855 year *2;* 375,975 year 3.

State cost: $_____ Federal cost: $_____

Cost share partners? Yes N o **XXX** (Identify partners and amount contributed by each)

Indicate the Topic **for** which you are applying (check only one box).

Natural Flow Regimes	Beyond the Riparian Corridor
Nonnative Invasive Species	Local Watershed Stewardship
Channel Dynamics/Sediment Transport	Environmental Education
Flood Management	Special Status Species Surveys & Studies
Shallow Water Tidal/ Marsh Habitat	■ Fishery Monitoring, Assessment & Research
Contaminants	Fish Screens

What county or counties is the project located in? Tehama County

What CALFED ecozone is the project located in? **3.2** Sacramento River, Keswick Dam **to** Red Bluff Diversion Dam

Indicate the type of applicant (check only one box):

State agency	■ Federal agency
Public/Non-profit joint venture	Non-profit
Local governmentidistrict	Tribes
University	Private **party**
Other:	

Indicate the primary species which the proposal addresses (check all that apply):

San Joaquin and East-side Delta tributaries fall-run chinook salmon

■ **Winter-run chinook salmon**

Late-fall run chinook salmon

Delta smelt

Splittail

Green sturgeon.

White Sturgeon

Waterfowl and Shorebirds

Migratory birds

Other listed T/E species:

Spring-run chinook salmon

Fall-run chinook salmon

Longfin smelt

Steelhead trout

Striped bass

All chinook species

All anadromous salmonids

American shad

Indicate the type of project (check only one box):

■ **Research/Monitoring**

Pilot/Demo Project

Full-scale Implementation

Watershed Planning

Education

Is this a next-phase of an ongoing project? Yes ____ **No XXX**

Have you received funding from CALFED before? Yes____ **No XXX**

If yes, list project title and CALFED number: _____

Have you received funding from CVPIA before? **Yes XXX** No ——

If yes, list CVPIA program providing funding, project title and CVPIA number (if applicable):
Program Name - Dedicated Project Yield and Evaluation Measures
Project Title - Expanded juvenile salmon and steelhead monitoring at Red Bluff Diversion Dam

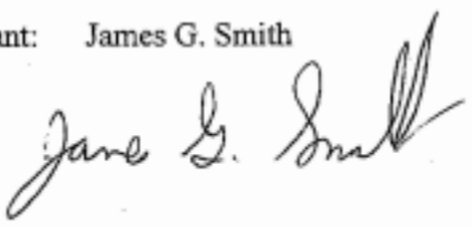
By signing below, the applicant declares the following:

The truthfulness of all representations in their proposal;

The individual signing the form is entitled to submit the application on behalf of the applicant (if the applicant is an entity or organization); and

The person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section 2.4) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.

Printed name of applicant: James G. Smith

Signature of applicant 

B. EXECUTIVE SUMMARY

Proposal Title: **Estimating the abundance of Sacramento River juvenile winter chinook salmon with eomaarisons to adult escapement**

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Primary Contact: James G. Smith
Mailing Address: 10950 Tyler Road
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Amount of funding requested: **for tasks 1&2 $345,808 year 1;** 359,855 year 2; 375,975 year 3.
Participants and collaborators: None

1. Project Description And Primary Objectives:

Rotary-screw traps at Red Bluff Diversion Dam (RBDD) have provided estimates of abundance and outmigration timing of downstream migrating salmonids since 1994. The Dam, located at river mile 243 on the Sacramento River about 2 miles southeast of the city of Red Bluff, has been shown to be an ideal site for winter-run monitoring because multiple traps can be attached to the dam and fished simultaneously within a transect across the river. The structures around RBDD control the channel morphology and the hydrological characteristics of the area providing for consistent sampling conditions for evaluating trends in juvenile abundance within and between years, and for developing a time invariant trap efficiency model. The model and quantitative methodologies were developed to estimate numbers of outmigrants passing RBDD while decreasing the program's reliance on and need for experimental fish, thereby minimizing impacts on Threatened and Endangered species.' These methodologies have been independently reviewed by biological statisticians. The primary objective of this project is to obtain juvenile production indices to correlate these indices with estimated escapement from adult counts at RBDD and the winter-run carcass survey.

Winter run were formally listed as endangered in 1994 in response to the continued decline and threats to the population. Since listing, numerous protective measures have been implemented in an attempt to protect winter run, including managing water exports by the Central Valley Project and State Water Project from the Sacramento-San Joaquin Delta. The CVP and SWP are authorized to take up to two percent of the estimated number of juvenile winter run entering the Delta. Number of juveniles entering the Delta are based on a juvenile production estimate (JPE). This estimate is derived from a production model that uses adult winter-run escapement from the RBDD adult counts as the primary variate. In-river estimates of juvenile production, based on rotary trap information, was found to be moderately correlated to JPE in trend ($r^2 = 0.581$); however, the JPE significantly underestimated in-river juvenile production in 3 of 5 brood years evaluated. JPE based on the adult carcass survey was used for comparative purposes and found to be highly correlated with in-river estimates of juvenile production in trend ($r^2 = 0.955$), although juvenile production was significantly overestimated in 1 of 4 brood years evaluated.

Furthermore the monitoring program tests the hypothesis that current and future implementation of restoration actions and activities are resulting in a measurable and scientifically defensible increase in abundance of this endangered species. This monitoring action is in support of CALFED ERP Goal 1 - Recovery of at-risk species.

C. PROJECT DESCRIPTION

1. Statement of the Problem

a. Problem

The Sacramento River system is unique in the fact that it alone supports four seasonal runs of chinook salmon *Oncorhynchus tshawytscha.* Named for the time the majority of adults enter freshwater on their spawning migration, these four runs include the fall, late-fall, winter, and spring chinook salmon. Steelhead trout ***Oncorhynchus*** *mykiss* is another indigenous salmonid in the system. Populations of all four runs of chinook salmon, and steelhead trout, have declined in the last 25 years. The most dramatic has been the winter-run chinook which have declined from a high count of almost 118,000 in 1969 to a low of 189 in 1994.

Historically, winter run utilized spring-fed streams that provided coldwater flows for summertime spawning, incubation, and rearing (Yoshiyama et al. 1998). Most ,oftheir historical habitat occurred in the upper Sacramento River drainage where cool-water conditions prevailed year-round from glacier and snow melt from Mount Shasta and Mount Lassen, and from cold-water springs. During the early part of the 20th Century, numerous small dams were built in the upper Sacramento River and its tributaries which began reducing the reproductive potential of winter-run chinook (NMFS 1996). With the construction of Shasta Dam on the Sacramento River in 1943, winter-run chinook were blocked from reaching their historical spawning grounds on the Little Sacramento, Pit, McCloud, and Fall Rivers (Yoshiyama et al. 1998). Fortunately, water discharged out of Shasta Lake after 1944 was sufficiently cool to allow for reproductive success in the Sacramento River in areas that had not historically supported winter-run production. Winter-run populations rebounded during the first two decades following completion of the dam because the continuous cold-water releases mimicked the necessary summertime flow conditions for winter-run production (Yoshiyama et al. 1998). However, winter-run populations started a steady and precipitous decline during the subsequent two decades, due in part, to the operations at Shasta Dam episodically supplying water with temperatures needed for successful egg incubation (NMFS 1997). Construction and operation of Red Bluff Diversion Dam (RBDD) in 1967 created another impediment to winter-run migration and survival in the main stem Sacramento River. Up to 40% of winter run encountering the dam during gates-in operation were blocked, and those passing upstream were delayed on average 13 days (Vogel et al. 1988). Adults blocked by the dam were forced to spawn downstream in areas where water temperatures were frequently too high for successful egg incubation (NMFS 1997). Winter-run populations declined by almost 99% from 1966 to 1991 despite conservation measures to improve habitat and spawning conditions. Winter run were formally listed as a threatened species in 1989 and reclassified as endangered in 1994 in response to the continued decline and continued threats to the population (NMFS 1997).

Currently adult escapement for winter run is estimated from counts of salmon using fishways that provide passage over RBDD. From 1969 through 1985, Red Bluff Diversion Dam (RBDD) was operated throughout the entire winter-run migration period. Beginning in 1986, gates were raised during the non-irrigation season to allow for unimpeded passage of most winter run (approximately 85% of the entire run; NMFS et al. 1996). The diversion and fishways currently operate from May 15 through September 15 which historically included only a small portion (15%) of winter-run migration when season long counts were possible (Snider et al. 2000). Annual escapement is now estimated by expanding the abbreviated count to upstream passage prior to May 15 when the dam is not operating. This extrapolation, based on historical *run* timing, can lead to large errors (43% to 230%; NMFS 1997) in estimation and has come under increased scrutiny. Starting in 1996, a winter-run carcass survey was initiated in the upper main stem Sacramento River to augment escapement estimates from the RBDD adult counts (Snider et al. 2000, Snider et al. 1999, Snider et al. 1998, Snider et al. 1997).

Since listing winter run, numerous protective measures have been implemented in an attempt to protect winter-run chinook, including managing water exports from the Sacramento-San Joaquin Delta from the Central Valley Project (CVP) and State Water Project (SWP). The United States Bureau of Reclamation and the

Department of Water Resources are authorized for incidental take of up to two percent of the estimated number of juvenile winter run entering the Delta in the CVP and SWP (CDFG 1996). Numbers of juvenile winter run entering the Delta are based on a juvenile production estimate (JPE; Diaz-Soltero 1995, 1997; Lecky 1998, 1999,2000). This estimate takes into account (1) effective population size in the upper Sacramento River derived from adult counts at Red Bluff Diversion Dam (for comparative purposes, we also used effective population size derived from the main-stem winter-run carcass survey), (2) 5% pre-spawning mortality rates, (3) number of ova per female (N=3,859), (4) percent loss due to temperature (Slater 1963, USFWS 1999), (5) sex ratio, (6) survival to emergence (25%) and (7) **fry** to pre-smolt/smolt survival (59%).

Juvenile monitoring at RBDD has been an ongoing activity since 1994 and was originally identified within the Biological Opinion for the Red Bluff Research Pumping Plant (RBRPP) to assess the effects on threatened (now endangered) winter-run chinook salmon (NMFS 1993). The original goals of this project were to determine the availability of juvenile salmonids for potential entrainment into the RBRPP by estimating juvenile production indices (JPI) on the population of fish moving past RBDD (Johnson and Martin 1997). These in-river estimates of juvenile abundance have been found to be moderately correlated to JPE ($r^2 = 0.581$), however, JPE based on RBDD adult counts significantly underestimated juvenile production in 3 of 5 brood years evaluated (Table 1). JPE based on the adult carcass survey, on the other hand, was found to be highly correlated with in-river estimates of juvenile production in trend ($r^2 = 0.955$), although juvenile production was overestimated in 1 of 4 brood years evaluated (outside of the 90% confidence interval of JPI, Table 1; Martin et al. 2000).

At present, the JPE does not account for inter-year variations in survival to emergence, ***fry*** to pre-smolt/smolt survival (Botsford and Brittnacher 1998), fecundity (Healy and Heard 1983), environmental conditions (Bigelow 1996, Reiser and White 1988, Heming 1981); and losses due to pollution (Arkoosh 1998), degraded water quality (Bradford 1994), density dependent and/or independent factors, infectious disease (Arkoosh 1998), and behavioral patterns (e.g., adult straying and spawning in streams where temperatures become too high during egg incubation; Hallock and Fisher 1985). Many of these factors are expected to influence juvenile production on a year-to-year basis while others may be year specific depending on environmental and/or anthropogenic-induced conditions. Resource managers will base decisions on less and more tenuous data without in-river indices monitoring the success or failure of juvenile winter-run production. Furthermore, additional investigations are needed to correlate in-river indices with estimated juvenile production to definitively demonstrate that the carcass survey is a satisfactory replacement for RBDD adult counts (USFWS 1997).

b. Conceptual model

A conceptual model demonstrating the importance of this and other monitoring programs is included on the following page. The model portrays the assumption that restoration actions for winter-run chinook salmon such as those outlined and currently implemented through the CVPIA, AFRP and CALFED restoration programs are designed to improve degraded habitat conditions that lead to a severely depressed winter-run salmon population. The attached conceptual model also notes the influence of the 1988 Cooperative Agreement signed between the U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service and California Department of Fish and Game to implement actions to benefit winter chinook salmon in the Sacramento River basin. Likewise, the model portrays the Draft Recovery Plan for the Sacramento River Winter-run Chinook Salmon (NMFS 1997). Information gained from indexing juvenile winter-run production in the upper River will contribute toward improved knowledge regarding winter chinook salmon life-history and abundance. Furthermore, statistical comparisons between JPE and JPI will decrease the scientific uncertainty associated with setting incidental limits for the CVP and SWP pumping facilities, and allow resource mangers to make more informed decisions.

Figure 1.-Conceptual Model

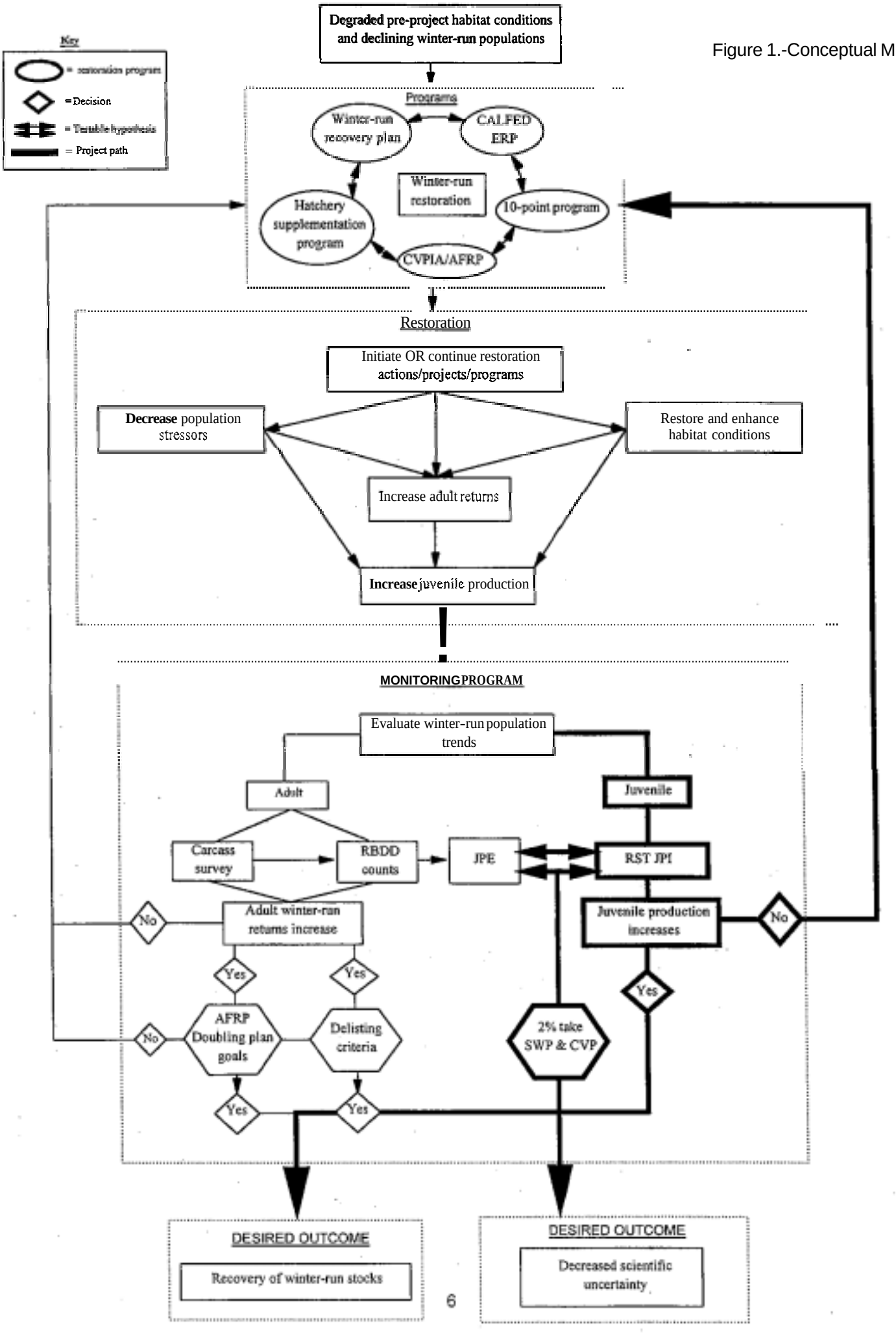

Table 1.—Comparisons between juvenile production estimates (JPE) derived from adult escapement and the juvenile production index (JPI) based on rotary-screw trap (RST) monitoring. RBDD JPE was estimated from adult escapement from expanded Red Bluff Diversion Dam adult counts. Carcass JPE is the juvenile production estimate from the winter-run carcass survey. Number of available adult females (9) used in calculations are in parentheses. Juvenile production was based on adult female escapement and assuming (1) 5% pre-spawn mortality rate unless otherwise noted, (2) 3,859 ova per spawning female, (3) 0% loss due to temperature, (3) 25% survival from egg to fry. Estimated number of juvenile winter run emigrating from the upper river denoted under RST JPI numeric passage.

Brood-year	JPE (fry) based on adult escapement				RST JPI	
	RBDD [a]		Carcass [b]		Numeric passage	90% C.I. [c] ±
95	573,062	(0 = 594)	--		1,663,637	854,138
96	279,778	(9 = 290)	527,795	(0 = 580)	384,146	145,438
97	219,963	(0 = 228)	1,426,286	(0 = 1,540)	1,876,636	765,079
98	770,835	(0 = 799)	4,446,919	(0 = 4,852)	4,628,592	1,053,562
99	491,058	(? = 509)	1,521,623	(9 = 1,626)	[d] 1,050,905	247,564

[a] Fry JPE obtained from Diaz-Soltero 1995 and 1997, and Lecky 1998, 1999 and 2000.

[b] Juvenile production based on carcass survey estimates and using estimated number of available females from Snider et al. (1997, 1998, 1999, and 2000). Carcass JPE estimates were derived using pre-spawning mortality rates of 6%, 4%, 5% and 3% for BY96, BY97, BY98 and BY99, respectively.

[c] 90% confidence interval (C.I.) around RST JPI numeric passage does not include a positive covariance term (see stock assessment of project proposal).

[d] Estimate based on data through 15 April 2000.

Implementation of restoration actions are designed to reduce stressors and restore and enhance habitat conditions, However, it is only through extensive field monitoring activities such as that outlined in this proposal that will allow for an informed adaptive management decision making process. Estimates of abundance derived from the juvenile monitoring program and other intensive surveys 'such as the Sacramento River winter-run chinook salmon carcass survey are useful for monitoring the cumulative effects of recovery actions and in the future, long-term continuous survey data may be used for evaluating whether doubling goals or delisting criteria are achieved.

c. Hypotheses being tested

The rotary trap juvenile production index (RST JPI) has been and will be used to track NMFS juvenile production estimate (JPE). Juvenile production estimates derived from effective spawner populations based on the RBDD adult counts (RBDD JPE) and carcass survey (Carcass JPE) will be used for comparisons with in-river estimates of juvenile abundance. The hypotheses being tested is:

H_o : RBDD JPE does not differ from in-river estimates of juvenile abundance (RST JPI)
H_{a1} : RBDD JPE differs from in-river estimates of juvenile abundance (RST JPI)

H_{o2} : Carcass JPE does not differ from in-river estimates of juvenile abundance (RST JPI)
H_{a2} : Carcass JPE differs from in-river estimates of juvenile abundance (RST JPI)

A paired t-test will be used for testing significant differences using years as replicates. We currently have five data points with the RBDD JPE and four with the Carcass JPE. Within-year evaluations will be made by comparing the JPE with the RST JPI, and determining whether the JPE falls within the bounds of error of estimation on the RST JPI.

Secondly, information collected during juvenile winter-run outmigrant monitoring will be used to assess the effect of restorations actions implemented by the AFRP, CVPIA and/or CALFED programs. It is expected that restoration actions implemented by these programs will have a positive net effect on juvenile production. The general restoration hypothesis being tested is:

H_{o3} : In-river estimates of juvenile abundance (RST JPI) at time ***t*** is greater than time ***t-3***
H_{a3} : Not H_{o3}

The RST JPI and associated bounds on error of estimation from the Red Bluff program will be used for evaluating inter-year trends in juvenile winter-run abundance. Historical data from the program (e.g., brood years 1998, 1999, and 2000) will be incorporated for evaluating $t = 1, 2,$ and **3** (brood years 2001,2002, and 2003).

d. Adaptive Management

At present NMFS manages CVP and SWP delta diversions by limiting winter-run entrainment to 2% of the estimated juvenile production. This estimate is based upon a production model that uses escapement from RBDD adult counts as the primary variate in the model.. In-river estimates of juvenile abundance has only been moderately correlated to NMFS JPE and there is indication that it is underestimating actual juvenile production. This proposal describes a monitoring activity designed to generate scientifically defensible estimates of juvenile production for endangered winter-run chinook salmon. These estimates will then be statistically compared to These indices, when compared to juvenile production estimates based on adult escapement, will allow resource managers to make decisions based on scientifically sound and less tenuous data.

e. Educational Objectives -Not applicable

2. Proposed Scope of Work

a. Location and/or Geographic Boundaries of the Project -

The RBDD is located at river mile 243 on the Sacramento River about 2 miles southeast of the city of Red Bluff in Tehama County, CA (Figure 2). The dam was completed in 1964 and began operation in 1966 (Liston and Johnson 1992). The purpose of the dam is to divert water into the Tehama-Colusa and Corning Canal system, for agriculture and wildlife refuges. The dam consists of eleven moveable gates which can be raised or lowered to impound and divert river flows into the canal. For 20 years the dam gates remained closed year-round, until winter of 1986 when gates were raised during the non-irrigation season (September 15'' to May 15th the following year) to improve upstream fish passage.

The spawning grounds for winter chinook salmon occur almost exclusively upstream from RBDD and within the mainstem Sacramento River. RBDD is an ideal rotary screw trap (RST) location because multiple traps can be attached to the dam and fished simultaneously within a transect across the river (Figure 1). The structures around the dam control the channel morphology and the hydrological characteristics of the area providing for consistent fishing conditions for evaluating trends in juvenile production between years.

b. Ayyroach

Rotary trapping.—Four eight foot rotary screw traps, attached directly behind RBDD, will be used to index abundance of juvenile winter chinook salmon out-migrating from the upper river. RST will be fished in river margin (east and west river-margins) and mid-channel (east and west mid-channels) habitats. Traps will be positioned within these spatial zones unless sampling equipment fails, river depths become too shallow (i.e., < 4 feet), or river hydrology restricts our ability to fish all traps (e.g., flood conditions or water velocity < 2 f/s). RST will be fished continuously throughout 24-hour periods, except during high-flow events and periods of high winter-run chinook abundance. During these periods, random periods will be sampled by stratifying between day and night, and fishing one of four non-overlapping periods within each strata. Estimates will be extrapolated to periods not fished by dividing catch by the sample-period selection probability.

Data will be collected for each trap clearing and include: (1) length of time trap was fished, (2) water velocity immediately in front of cone at depth 61 cm, *(3)* number of cone rotations during the fishing period, (4) depth of cone submerged, (5) debris type and amount, (6) captured fish identification, enumeration and fork length and (7) environmental conditions including water and air temperatures, and water turbidity. Run of chinook salmon will be determined from daily length tables (DWR 1992). Water velocity will be measured using an Oceanic@Model 2030 flow torpedo. Water samples will be taken to measure turbidity and analyzed in the laboratory using a Model 2100A Hach® Turbidimeter. Volumes of water sampled (or sieved) by RST will be estimated from the (1) area of the cone submerged, (2) average velocity of water entering the cone, and *(3)* duration of the sample. River discharge (Q) will be obtained from the California Data Exchange Center's Bend Bridge river gauge. The percent water sampled passing RBDD will be estimated by the ratio of water volume sampled to total Q passing RBDD.

Trap efficiency.—Fish will be marked with fluorescent spray dye (Phinney 1967)and/or bismark brown stain (Mundie and Traber 1983). Fish marked for trap efficiency trials will be held for 24 hours before being released 4 km upstream from RBDD. It will be assumed that negligible mark-induced mortality will occur following the 24-hour holding period (Gaines 1999). Several release strategies will be investigated including: (1) hatchery and wild stock releases (Roper and Scamecchia 1999); (2) diurnal (sunrise) and nocturnal (sunset) releases; (3) newly emerged (median length ≤ 45mm), pre-smolt (45mm ≤ median length ≤ 80mm) and smolt-sized (median length > SO mm) releases; (4) gates-in and gates-out releases; and, (5) locations of release (4 km vs. 2 km releases).

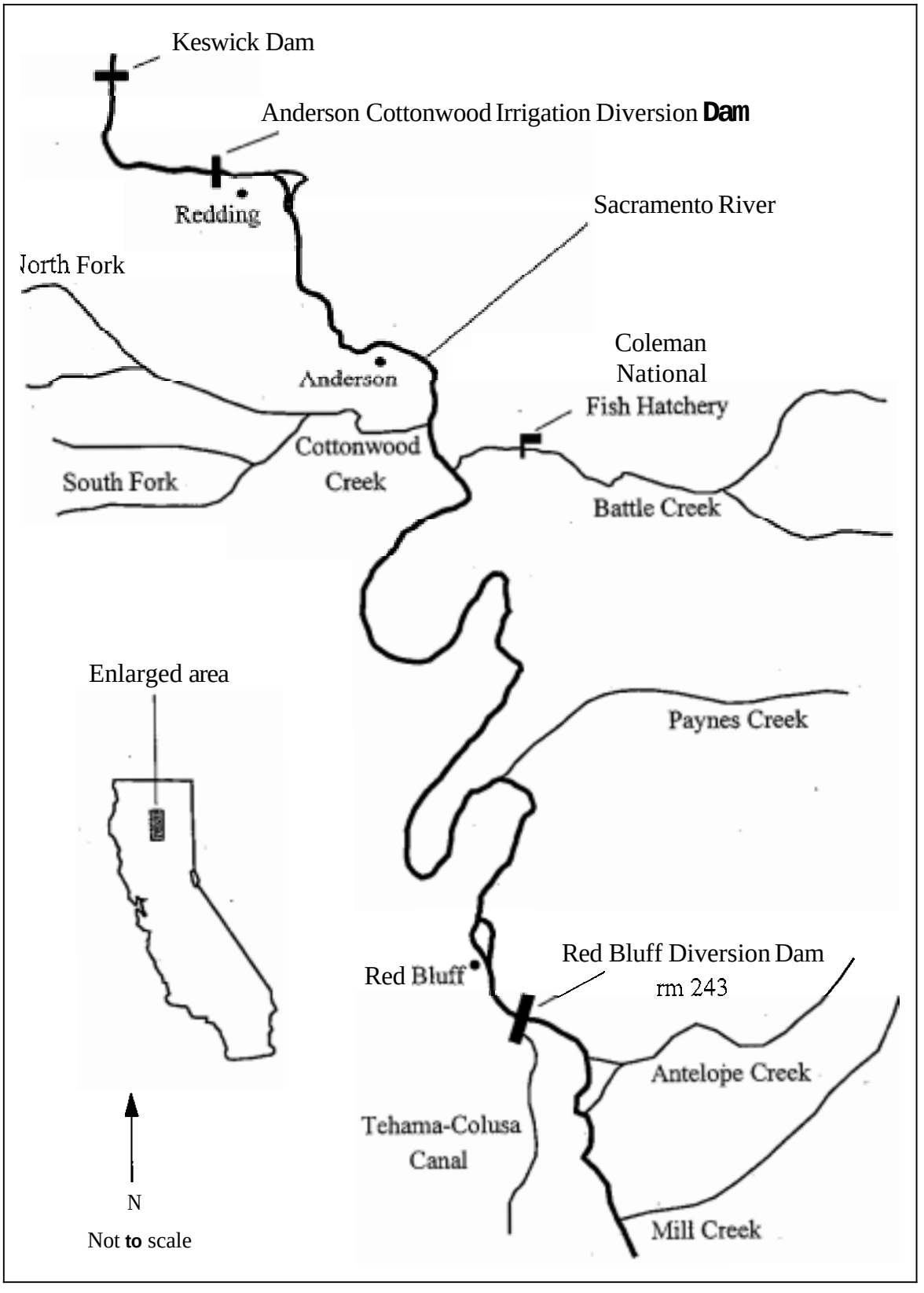

Figure 2.--Location of Red Bluff Diversion Dam on the Sacramento River at river mile 243.

Stock assessment

The following procedures and formulae will be used to derive yearly rotary trap juvenile production indices (RST JPI) for numbers of winter-run salmon emigrating from the upper Sacramento River.

Define C_{di} = catch at trap i (i=1,...,t) on day d (d=1,...,n), and X_{di} =volume sampled at trap i (i=1,...,t) on day d (d=1,...,n). Daily salmonid catch and water volume sampled will be expressed as:

1 $$C_d = \sum_{i=1}^{t} C_{di} \qquad X_d = \sum_{i=1}^{t} X_{di}$$

The percent river volume sampled (%Q) will be estimated from the ratio of water volume sampled (X_d) to river discharge (QJ on day d:

2. $$\%Q_d = \frac{X_d}{Q_d}$$

Total salmonid passage will be estimated on day d (d = 1,...,n) by:

3. $$\hat{P}_d = \frac{C_d}{\hat{T}_d}$$

4. $$\hat{T}_d = (0.0091)(\%Q_d) - 0.00252$$

T_d = Predicted trap efficiency on day d (Neter et al. 1989; Appendix 1).

Monthly passage (PI.—Population totals for numbers of chinook salmon passing RBDD by month will be derived from $\hat{P}_d$ where there are n days sampled of N days within the month:

5. $$\hat{P} = \frac{N}{n}\sum_{d=1}^{n} \hat{P}_d$$

Estimated variance

6. $$Var(\hat{P}) = (1-\frac{n}{N})\frac{N^2}{n} s^2_{\hat{P}_d} + \frac{N}{n}\left[\sum_{d=1}^{n} \text{var}(\hat{P}_d) + 2\sum_{i<j}^{n} \text{cov}(\hat{P}_i, \hat{P}_j)\right]$$

The first term in Equation (6) is associated with sampling of days within the month.

7. $$s^2_{\hat{P}_d} = \frac{\sum(\hat{P}_d - \bar{\hat{P}})}{n-1}$$

The second term in Equation (6) is associated with estimating P_d within the day from the trap efficiency model.

8 $$Var(\hat{P}_d) \doteq \frac{P_d(1-T_d)}{\hat{T}_d} + \text{var}(\hat{T}_d)\frac{P_d(1-T_d) + \hat{P}_d\hat{T}_d}{\hat{T}_d^2}$$

where;

9 $\text{var}(T_d)$ = error variance of trap efficiency model

The third term in equation *(6)* is associated with estimating both $\hat{P}_i$ and $\hat{P}_j$ with the same trap efficiency model.

10. $$\operatorname{cov}(\hat{P}_i, \hat{P}_j) = \frac{\operatorname{cov}(\hat{T}_i, \hat{T}_j)\,\hat{P}_i\,\hat{P}_j}{\hat{T}_i\,\hat{T}_j}$$

$$Cov(\hat{T}_i, \hat{T}_j) = \operatorname{var}(\alpha) + x_i \operatorname{cov}(\hat{\alpha}, \hat{\beta}) + x_j \operatorname{cov}(\hat{\alpha}, \hat{\beta}) + x_i x_j \operatorname{var}(\beta)$$

for some $\hat{T}_i = \hat{\alpha} + \hat{\beta} x_i$

Bounds on the error of estimation will be constructed around $\hat{P}$.

11. $$\text{Bound} = P \pm t_{[\alpha/2, n-1]} \sqrt{\operatorname{var}(\hat{P})}$$

Yearly rotary trap juvenile production indices (RST JPI) for numbers of winter run emigrating out of the upper river will be estimated by summing $\hat{P}$ and bounds across months within a brood year (July through June the following year). The quantitative methodology for juvenile production indices; including variance estimates, were developed by staff biologists at NCVFWO and statisticians from Chico State University. These methods have received independent reviews by Dr. John Skalski, biological statistician, University of Washington, and Dr. Lyman McDonald's, senior biometrician, Western Ecosystems Technology, Wyoming.

c. Monitoring and Assessment Plans -Not applicable

d. Data Handling and Storage

Standard database structures used by the Interagency Ecological Program (IEP) real-time monitoring program will be used to enter and store juvenile monitoring data. Data will be made available through the IEP website and will be electronically entered on a day-to-day basis. Data will be double entered or double error checked, using printed hard copies, as part of the quality control and quality assurance program.

e. Expected Products/Outcomes

NCVFWO will be responsible for daily summaries to be sent to interested parties responsible for the management and operation of the Central Valley Project, State Water Project, and Delta operations. Daily summaries will include length-frequency distributions and daily passage estimates (RST JPI). Real-time data summaries will be posted onto the IEP website or e-mailed to interested parties on Monday, Wednesday, and Friday of each week. Annual and quarterly reports will be submitted detailing the previous period(s) monitoring. **A** final report will be submitted comparing in-river estimates of production with JPE (carcass survey and RBDD adult counts), and include management recommendations addressing whether the carcass survey is a satisfactory replacement for RBDD adult counts (USFWS 1997).

f. Work Schedule

Work for Task 1 will include rotary trapping from July through March to completely monitor juvenile winter run emigrating from the upper Sacramento River. Traps will be fished seven days per week. The following time line is proposed:

Project year	Task 1	Task 2
Year 1	1 July 2001 - 31 March 2002	1 April 2002 - 30 June 2002
Year 2	1 July 2002 - 31 March 2003	1 April 2003 - 30 June 2003
Year 3	1 July 2003 - 31 March 2004	1 April 2004 - 30 June 2004

Previous juvenile monitoring at Red Bluff has found that most all winter run emigrate from the upper river by March (99.87% of total production). Although not needed for meeting the objectives of this proposal, if funded, Task 2 would include juvenile monitoring year-round at Red Bluff. Juvenile production indices would be developed for late-fall, fall and spring runs, *O. mykiss*, and green sturgeon emigrating from the upper river.

g. Feasibility

Juvenile salmonid monitoring has been an activity of the U.S. Fish and Wildlife Service in Red Bluff since 1981. These activities have made significant contributions to our understanding of the life history of rearing salmon in the upper Sacramento River from Keswick Dam to Hamilton City. Rotary trapping at Red Bluff Diversion Dam (RBDD) has been an ongoing activity since 1994. This study was identified within the Biological Opinion for the Pilot Pumping Plant on threatened (now endangered) winter chinook (NMFS 1993). Rotary trapping at RBDD has amassed a considerable baseline of information including refinement of experimental procedures. The feasibility of successfully implementing this project is based on the following points:

- The spawning grounds for winter chinook salmon occur almost exclusively upstream from RBDD.
- Based on comparisons with adult escapement, the RST JPI is an exceptional method for evaluating year-class strengths in juvenile winter-run abundance and for supportive evidence of estimated escapement.
- Quantitative methodologies have been independently reviewed and supported by biological statisticians.
- Red Bluff Diversion Dam is an ideal trapping location for winter-run salmon because multiple traps can be attached to the dam and fished simultaneously within a transect across the river
- The RST program has been able to stay within ESA Section 10 take limits by implementing a scientifically sound sub-sampling design (see below). This same design and trapping location allows us to fish during river rises when other rotary trapping programs are unable to fish.
- The structures around RBDD control the channel morphology and the hydrological characteristics of the area providing for consistent sampling conditions for evaluating trends in juvenile abundance within and between years, and for developing a time invariant efficiency model.
- Researchers and resource managers in the upper river have been limited in their ability to conduct mark/recapture experiments because of increased Federal and State protections afforded to Threatened and Endangered species. The total abundance model and quantitative methodology have been developed to estimate numbers of outmigrants passing RBDD while decreasing the program's reliance on and need for experimental fish, thereby minimizing impacts on T&E species.

Juvenile production indices have been scrutinized in the Central Valley because of the physical constraints of fishing rotary traps at flood stage. The quantitative methodologies and sampling design of this program allow traps to routinely fish river flows in excess of 60,000 cfs and still obtain estimates of juvenile outmigration. Monitoring during storm events will be accomplished by stratifying between day and night, and fishing one of four non-overlapping periods within each strata. Catch during sub-sampled periods will be expanded to the entire strata and extrapolated by the predicted trapping efficiency from Equation 4. Collection of data during high-flow and rising river flows are extremely challenging; without a good sub-sampling program in place, data on juvenile outmigration during these events would be difficult if not impossible to obtain.

Monitoring projects are under strict ESA take restrictions for listed species. We would routinely exceed our take limits during high production years if sub-sampling methodologies were not developed for monitoring during high production years. Our current Section 10 permit expires June 30, 2001 and covers take of up to 20,000 winter run with 3% incidental trap mortality. The NCVFWO is currently preparing additional Section 10 permits for coverage of other listed species encountered during juvenile trapping

D. APPLICABILITY TO CALFED ERP GOALS AND IMPLEMENTATION PLAN AND CWIA PRIORITIES

1. ERP Goals and CWIA Priorities.

This proposal addresses scientific uncertainties associated with diversion effects of the State Water Project and Central Valley Project on winter-run chinook salmon and fishery monitoring assessments. Juvenile indices for winter run have been generated since 1995 documenting the success of juvenile production in the upper river. Continuation of this work in necessary for continuity in estimation methodology, and to augment questionable spawner abundance generated by fish counts at RBDD. Secondly, the monitoring program tests the hypothesis that current and future implementation of AFRP, CVPIA, CALFED or other restoration program actions are resulting in a measurable and scientifically defensible increase in abundance of endangered winter chinook salmon. This monitoring is therefore in direct support of CALFED ERP Goal 1 - recovery of at-risk species.

2. Relationship to Other Ecosystem Restoration Projects.

The Ecosystem Restoration Program Plan (ERPP) of the CALFED Program contains elements designed to restore ecological health of the Bay-Delta system. Ecosystem monitoring is identified as a critical step of the ERPP process, providing essential feedback about how the biological system responds to restoration efforts and providing a meas to adjust future actions through adaptive management. The success of restoration efforts must ultimately be evaluated through measurement of population-level responses. Ecosystem Restoration Strategic Goal 1 of the CALFED Bay-Delta program places highest priority on restoring populations of at-risk ESA-listed species, such as winter chinook salmon, which strongly affect the operation of the State Water Project and Central Valley Project diversions to the south Delta.

3. Requests for Next-Phase Funding - Not applicable

4. Previous Recipients of CALFED or CVPIA funding
Program Name - Dedicated Project Yield and Evaluation Measures
Project Title - Expanded juvenile salmon and steelhead monitoring at Red Bluff Diversion Dam

5. System-Wide Ecosystem Benefits.

This project as described has the potential to document the effectiveness of past and future CALFED, AFRP, CVPIA and other ecosystem restoration activities. Additionally, this program intimately ties into other projects requesting funding through this PSP. While this project is largely aimed at developing estimates of juvenile winter-run production in the upper Sacramento River, data obtained from a carcass survey executed by the U.S. Fish and Wildlife Service and the California Department of Fish and Game will be used to correlate numbers of adult winter-run returns with juvenile production. This information will help refine the National Marine Fisheries Service's juvenile production estimate used for managing water diversions to the south Delta.

The winter-run carcass survey was initially implemented to compare and augment ladder counts at RBDD. Management decisions have been and will continue to be made using estimated escapement from RBDD adult counts until it is conclusively shown that the carcass survey is a satisfactory replacement (USFWS 1997); juvenile monitoring at Red Bluff is an important component of this evaluation. In-river production indices have been shown to be highly correlated in both trend and magnitude to the winter-run carcass survey. These trends were evident for four years that the carcass survey has occurred; however, additional years of study are needed before final and conclusive decisions are made.

Data from this program has been used for a variety of management purposes including indicators of year-class strengths, genetic sampling, and triggers for remedial measures pertaining to flow, temperature, and entrainment.

E. QUALIFICATIONS.

Northern Central Valley Fish and Wildlife Office (NCVFWO) was established in 1978 as part of the U.S. Fish and Wildlife Service's responsibility to facilitate restoration of Pacific salmonids. The construction and operation of dams and water diversion projects and the subsequent degradation and loss of habitat have been the primary contributors to the decline of most all anadromous fish stocks in the upper Sacramento River. Specific goals of the NCVFWO are to: 1) stabilize or increase the runs of anadromous salmonids in the Sacramento River system, 2) improve the effectiveness of federal fish propagation facilities in California and Nevada, 3) protect and restore the productivity of natural habitats in the Sacramento River system, and 4) continue development of information and strategies for protecting the natural habitats of the Sacramento River system as migration routes, spawning areas, and nursery areas for anadromous salmonids. The staff consists of over 40 biologists and support personnel which have working experience in the upper Sacramento River.

Project Personnel and Qualifications

James *G*. Smith..—Mr. Smith serves as Project Leader for the Service's Northern Central Valley Fish and Wildlife Office (NCVFWO) at Red Bluff where he is responsible for the management of over 40 biologist and support staff. Mr. Smith received a B.S. degree in fisheries biology from Humboldt State University in 1975 and did post-graduate studies at HSU from 1976-79. He has worked as a professional biologist for over 20 years in Oregon, Washington and California. For the past seventeen years he has been personally involved with numerous fishery studies involving salmon including fish passage investigations at RBDD, monitoring downstream migrants of juvenile salmonids, hatchery evaluation efforts at Coleman NFH, and salmon spawning gravel restoration evaluation activities. The office has responsibilities that include identifying and defining factors affecting the abundance and survival of anadromous salmonids produced in the Sacramento River Basin, California. Mr. Smith works on a daily basis with numerous federal, state, and private entities in developing actions and programs for restoring, conserving, and enhancing anadromous salmonids in the upper Sacramento River.

Craig D. Martin .—Mr. Martin is a fishery biologist at the Service's NCVFWO in Red Bluff where he is responsible for many of the office's juvenile monitoring programs. Mr. Martin received a B.S. degree in wildlife/fisheries management from West Virginia University in 1991 and a M.S. degree in fisheries biology from Oklahoma State University in 1995. He started his career working in West Virginia and Pennsylvania as a fisheries technician for West Virginia University and the West Virginia Department of Natural Resources. Mr. Martin was a research assistant for the Oklahoma Cooperative Fish and Wildlife Research Unit from 1992 - 1995 evaluating native smallmouth bass stream fisheries. Since 1995, Mr. Martin has overseen the Service's evaluation of in-river impacts of the Red Bluff Research Pumping Plant on downstream migrating juvenile chinook salmon. Additionally, he manages *three* juvenile salmonid monitoring projects located on the mainstem Sacramento River, Battle Creek, and Clear Creek. Mr. Martin has authored seven technical reports including two peer reviewed articles; one of which was published in Fisheries.

F. COST

1. Budget.

The budget is summarized in Table 2 (page 17) and salaries and benefits are detailed in Table 3 (page 18). Costs are adjusted 4% annually for inflation. The FWS overhead rated for CALFED projects is 3%, not to exceed $300,000 for each agreement. Regional administrative costs equal 2% and California Nevada Operations Office costs equal 1% of the overall 3% overhead. The Service's National indirect costs have been waived for CALFED agreements.

Supplies (with first year unit costs; costs thereafter are adjusted 4% for inflation) include: fish anesthetic $1,200, spray-dye equipment and granules $500, bismark brown stain $800, cell phone and pagers $500, and

one computer budgeted per year at $2,500. Equipment costs also include $10,000 per year for trap maintenance and part replacements. Our traps have been in use since 1994 and need to be continually maintained, especially when fished during high-flow and flood events.

Task one can be funded separately from task two. Task one includes four traps fishing from July 1 through March 31 and includes staffing for subsampling during storm events and periods of high winter-run abundance. Task two funds trapping operations during April, May and June and cannot be funded separately from task one. Tasks one and two includes year-round juvenile monitoring at Red Bluff Diversion Dam.

2. Cost-Sharing - None

G. LOCAL INVOLVEMENT

We currently coordinate field activities and research projects with students from the Sacramento River Discovery Center (SRDC) and local school districts. The SRDC is a local non-profit natural resource academy where high school and college students serve as interns. Numerous students have developed studies, worked with biologists on their projects, participated in on-going research and have produced written reports. Additional outreach opportunities exist with the SRDC for CALFED sponsored programs.

Table 2.—Annual and total budget costs for "Estimating the abundance of Sacramento River juvenile winter chinook salmon with comparisons to adult escapement".

Year	Task	Salary and Benefits	Training, Travel and Per Diem	Vehicle Gas and Mileage, Supplies & Expendables	Equipment including Vehicle and Computer Purchases	Service Contracts	Overhead (3%)	Total Cost
Year 1	Task 1	$260,385	$5,700	$12,207	$16,750	$0	$8,851	$303,893
	Task 2	$37,487	$0	$3,207	$0	$0	$1,221	$41,915
Total Cost Year 1		$297,872	$5,700	$15,414	$16,750	$0	$10,072	$345,808
Year 2	Task 1	$270,800	$5,928	$12,695	$17,420	$0	$9,205	$316,048
	Task 2	$39,196	$0	$3,335	$0	$0	$1,276	$43,807
Total Cost Year 2		$309,996	$5,928	$16,030	$17,420	$0	$10,481	$359,855
Year 3	Task 1	$283,308	$6,165	$13,202	$18,117	$0	$9,624	$330,416
	Task 2	$40,764	$0	$3,468	$0	$0	$1,327	$45,559
Total Cost Year 3		$324,072	$6,165	$16,670	$18,117	$0	$10,951	$375,975
Total Project Cost	Task 1	$814,493	$17,793	$38,104	$52,287	$0	$27,680	$950,357
	Task 2	$117,447	$0	$10,010	$0	$0	$3,824	$131,281
	Total	$931,940	$17,793	$48,114	$52,287	$0	$31,504	$1,081,638

Table 3- Estimating the abundance of Sacramento River juvenile chinook salmon with comparisons to adult escapement Positions are fishery biologists unless otherwise noted.

YEAR ONE

Task one	Level	Salary	Benefits	Total	FTE's	TOTAL
9 months	GS-5	23,732	1.827	25.559	2.000	51,118
Winter run	GS-5	24,522	6.081	30,604	2.250	68,858
	GS-7	30.374	7.533	37,907	0.750	28,430
	GS-9	38.355	10.548	48,903	0.800	39,122
	GS-11	46,408	12,762	59,170	0.500	29.585
	*Other	34,255	7.887	42,142	0.920	38,771
	overtime					4,500
					7.220	260,385

Task Two	Level	Salary	Benefits	Total	FTE's	TOTAL
3 months	GS-5	23,732	1.827	25,559	0.000	
April, May & June	GS-5	24,522	6,081	30,604	0.750	22,953
	GS-7	30,374	7,533	37,907	0.250	9,477
	GS-9	38,355	10.548	48,903	0.000	0
	GS-11	46,408	12,762	59,170	0.000	0
	* Other	34.255	7,887	42,142	0.120	5,057
					1.120	37,487

YEAR TWO

Task one	Level	Salary	Benefits	Total	FTE's	TOTAL
Winter run	GS-5	24.681	1,900	26,581	2.000	53,163
	GS-5	25,503	6,325	31.828	2.250	71,613
	GS-7	31.589	7.834	39,423	0.750	29,568
	GS-9	39,889	10,970	50,859	0.800	40,687
	GS-11	48.264	13,273	61,537	0.500	30.768
	"Other	35,625	8.203	43,828	0.920	40,322
	Overtime					4,680
					7.220	. 270,800

Task Two	Level	Salary	Benefits	Total	FTE's	TOTAL
3 months	GS-5	24,681	1,900	26,581	0.000	
April, May & June	GS-5	25,503	6,325	31,828	0.750	23,871
	GS-7	'31,589	7.834	39.423	0.250	9.856
	GS-9	39.889	10,970	50,859	0.000	0
	GS-11	48,264	13,273	61,537	0.000	0
	*Other	37.050	8,531	45.581	0.120	5,470
					1.120	39,196

YEAR THREE

Task one	Level	Salary	Benefits			TOTAL
Winter run	GS-5	25,668	1,976	27,644	2.000	55,288
	GS-5	26,523	6.578	33,101	2.250	74,477
	GS-7	32.853	8,147	41,000	0.750	30,750
	GS-9	41.485	11,408	52,893	0.800	42,314
	GS-11	50,195	13.804	Total 63,999	FTE's	32,000
	* Other	38,532	8.872	47,404	0.920	43,612
	Overtime					4,867
Total					7.220	283,308

Task Two	Level	Salary	Benefits	Total	FTE's 0.500	TOTAL
3 months	GS-5	25.668	1,976	27,644	0.000	
April, May & June	GS-5	26,523	6,578	33,101	0.750	24,826
	GS-7	32,853	8,147	41,000	0.250	10,250
	GS-9	41,485	11,408	52,893	0.000	0
	GS-11	50,195	13,804	63,999	0.000	0
	* Other	38.532	8,872	47.404	0.120	5,688
Total					1.120	40,764

* Other positions- administrative officer. office automation clerk, maintenance worker, etc.

H. COMPLIANCE WITH STANDARD TERMS AND CONDITIONS

The Fish and Wildlife Service (Service) cannot agree to a standard clause requested for State funded projects. Attachment D, Terms and Conditions for State Proposition 204 Funds, Section **3,** states "Performance Retention: Disbursements shall be made on the basis of costs incurred to date, less ten percent of the total invoice amount. Disbursement of the ten percent retention shall be made either: (1) upon the Grantee's satisfactory completion of a discrete project task (ten percent retention for task will be reimbursed); or (2) upon completion of the project and Grantee's compliance with project closure requirements specified by CALFED (ten percent retention for entire project will be disbursed)".

The Services's authorization to enter into agreements with non Federal entities was changed in FY 2000. Our FY2000 Appropriations bill authorizes the Service to enter into contracts with State agencies when advance payment to the Service is not possible. In accordance with the requirements imposed by Congress in the FY2000 Appropriations bill and report language, the Services Director must approve a project when advance payment is not possible and certify that payments will be made in full by the State within 90 days after the Service issues an invoice.

Specifically, the 10% retention clause cannot allow timely payments for the following reasons:

In our Federal Financial. System (FFS) accounting program, a periodic invoice (either quarterly or monthly depending on the terms of the contract) is automatically issued from our finance center based on actual expenditures of the Service on a project. Invoices include a payment due date on the invoice and when payment is not received in full by that due date, the system automatically shows the unpaid balance as delinquent. Depending on how delinquent the payment is, interest, penalty and administrative charges may also accrue. With 10% retention withheld on each invoice, the 10% retention amount then causes applicable invoice record in FFS to be partly delinquent and remain delinquent until the project or individual tasks identified in the contract are completed and the retention is released.

The Service's Finance Center must report to the Department of Treasury if the Service is owed funds by any entity. Therefore, when accounts remain delinquent due to the 10% retention of payments owed the Service, that delinquency continues to be reported to Treasury.

The Service has previously entered into agreements with the State of California that do not contain the 10% retention clause.

We have asked the States Deputy Attorney General (see attached letter) to provide clarifying guidance to the Department of Water Resources that is general in scope, which can also be applied to contracts related to the CALFED program.

As a federal entity, we are bound to comply with all Federal standard clauses, and all State standard clauses or terms that do not conflict with or supercede Federal laws. Our office will continue to work with the State closely on State funded projects. If the State is not satisfied with the work performed by the Service, the State project manager should contact the Service's project manager to correct the performance problem. If needed, upon notification interim billings can be canceled until the State is satisfied with the Service's performance.

We can comply with all other State and Federal standard clauses.

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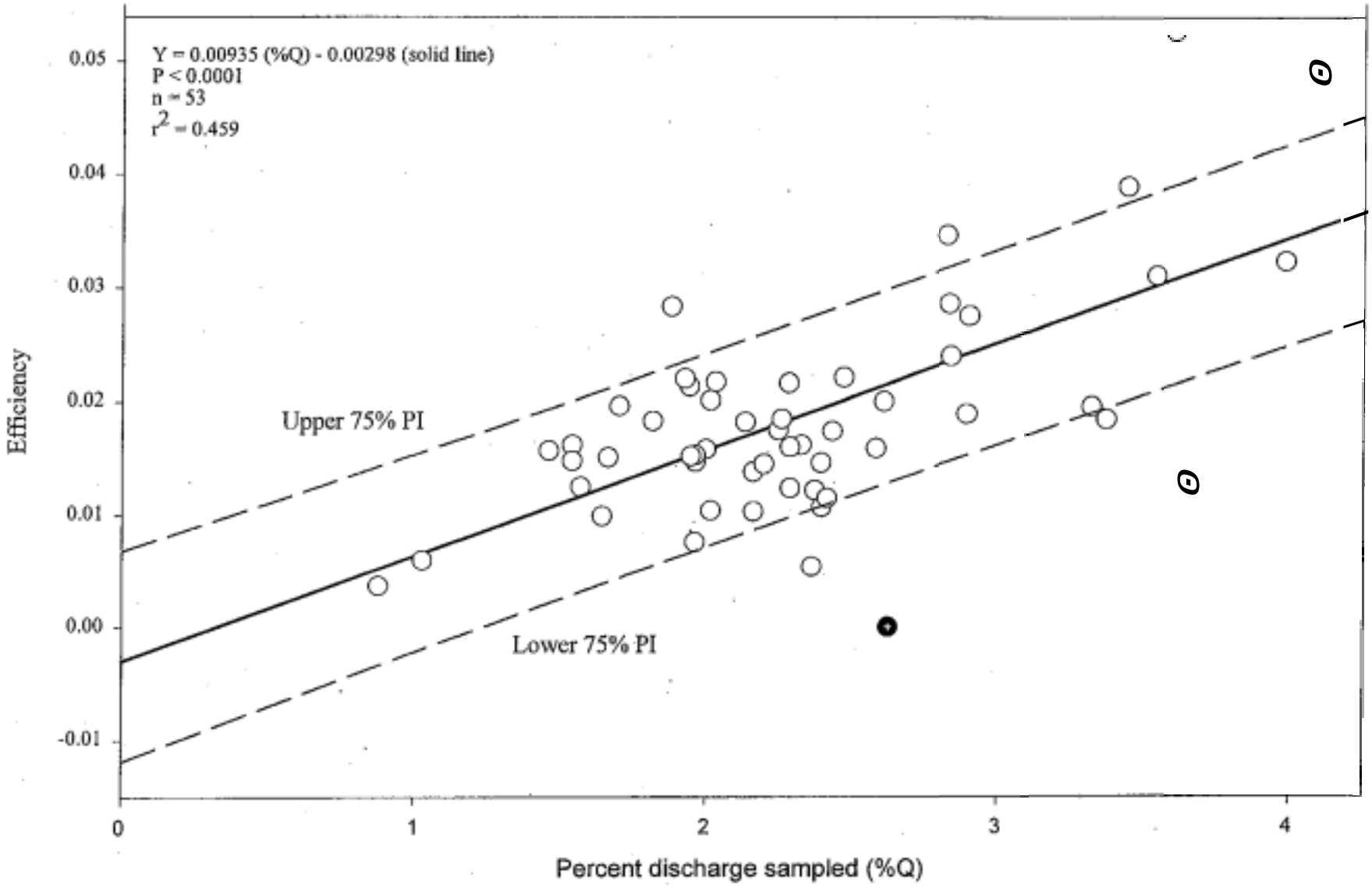

Appendix 1.--Trap efficiency model for combined traps at Red Bluff Diversion Dam. Percent dishcarge sampled (%Q) was linearly regressed with efficiency. Fifty-four trials reported although one trial resulted in zero recaptures and was not used in the regression model.

ENVIRONMENTAL COMPLIANCE CHECKLIST

All applicants must fill out this Environmental Compliance Checklist. Applications must contain answers **to** the following,questions to be responsive and to be considered for funding..*Failure to answer these questions and include them with the application will result in the application being considered non-responsive and not considered for finding.*

1. Do any of the actions included in the proposal require compliance with either the California Environmental Quality Act (CEQA), the National Environmental Policy Act (NEPA), or both? **YES.**

2. If you answered yes to # 1, identify the lead governmental agency for CEQA/NEPA compliance. **Fish and Wildlife Service.**

3. If you answered no to # 1, explain why CEQA/NEPA compliance is not required for the actions in the proposal. **NA see # 1.**

4. If CEQA/NEPA compliance is required, describe how the project will comply with either or both of these laws. Describe where the project is in the compliance process and the expected date of completion. **The type of proposed monitoring projects are categorically excluded in the Fish and Wildlife Service Departmental Manual at 516 DM 6 Appendix 1.4 Categorical Exclusions Section B. Resource Management: (1) Research, inventory, and information collection activities directly related to the conservation of fish and wildlife resources.**

5. Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal? If yes, the applicant must attach written permission for access from the relevant property owner(s). Failure to include written permission for access may result in disqualification of the proposal during the review process. Research and monitoring field projects for which specific field locations have not been identified will be required to provide access needs and permission for access with 30 days of notification of approval. **NO**

6. Please indicate what permits or other approvals may be required for the activities contained in your proposal. Check all boxes that apply.

LOCAL

Conditional use permit ___
Variance ___
Subdivision Map Act approval ___
Grading permit ___
General plan amendment ___
Specific plan approval ___
Rezone ___
Williamson Act Contract cancellation
Other _____(please specify)
None required ___

STATE

CESA Compliance XXX
Streambed alteration permit ___
CWA § 401 certification ___
Coastal development permit ___
Reclamation Board approval ___
Notification ___
Other- Scientific Collection permit
None required ___

FEDERAL

ESA Consultation XXX (NMFS)
Rivers & Harbors Act permit ___
CWA § 404 permit ___
Other _____(please specify)
None required ___

LAND USE CHECKLIST

All applicants must fill out this Land Use Checklist for their proposal. Applications must contain answers to the following questions to be responsive and to be considered for funding. *Failure to answer these questions and include them with the application will result in the application being considered non-responsive and not considered for funding.*

1. Do the actions in the proposal involve physical changes to the land (i.e. grading, planting vegetation, or breeching levees) or restrictions in land use (i.e. conservation easement or placement of land in a wildlife refuge)? **NO.**

2. If NO to # 1, explain what type of actions are involved in the proposal (i.e., research only, planning only). **The monitoring projects will not involve physical changes to the land.**

3. If YES to # **1**, what is the proposed land use change or restriction under the proposal? **NA see # 1.**

4. If YES to # 1, is the land currently under a Williamson Act contract? **NA see # 1.**

5. If YES to # 1, answer the following: current land use, current zoning, current general plan designation: **NA *see* # 1.**

6. If YES to #1, is the land classified as Prime Farmland, Farmland of Statewide Importance or Unique Farmland on the Department of Conservation Important Farmland Maps? **NA see # 1.**

7. If YES to # 1, how many acres of land will be subject to physical change or land use restrictions under the proposal? **NA *see* # 1.**

8. If YES to # 1, is the property currently being commercially farmed or grazed? **NA *see* # 1.**

9. If YES to #8, what are the number of employees/acre, the total number of employees **NA see # 1.**

10. Will the applicant acquire any interest in land under the proposal (fee title or a conservation easement)? NO.

11. What entity/organization will hold the interest? **NA *see* # 1.**

12. If YES to # 10, answer the following total number of acres to be acquired under proposal, number of acres to be acquired in fee, number of acres to be subject to conservation easement. **NA *see* # 10.**

13. For all proposals involving physical changes to the land or restriction in land use, describe what entity or organization will: manage the property, provide operations and maintenance services, conduct monitoring. **NA see # 10.**

14. For land acquisitions (fee title or easements), will existing water rights be acquired? **NA see # 10.**

15. Does the applicant propose'any modifications to the water right or change in the delivery of the water? **NA see # 10.**

16. If YES to.# 15, describe. **NA see # 10.**

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Northern **Central Valley** Fish **and Wildlife Office**
10950 Tyler Road
Red Bluff, California 96080
Office (530) 527-3043 Fax (530) 529-0292

May 15,2000

Mr. Ron Hill
Director, Public Works
1855 Placer Street
Redding, California 96001

Dear Mr. Hill

The U.S. Fish and Wildlife Service is pleased to provide you with copies of four salmon and steelhead monitoring, assessment, and research project proposals we are submitting to the CALFED Bay-Delta Program for funding consideration in response to the 2001 Proposal Solicitation Package. The projects that are proposed to be conducted in or near Shasta and Tehama counties are,

1 Battle Creek anadromous salmonid monitoring projects,
2. Clear Creek juvenile salmonid monitoring project,
3. Sacramento River winter chinook salmon carcass survey,
4. Estimating the abundance of Sacramento River juvenile winter chinook salmon with comparisons to adult escapement.

Prior to conducting any monitoring efforts on private lands, written permission from landowners will be obtained. We have already taken steps to contact local landowners, discuss with them our proposed activities, and ask for permission to conduct these studies on their lands.

The information generated from these monitoring efforts are expected to improve our understanding of the ecological and physical processes affecting the salmon and steelhead resources of the north state. Through projects such as these, we hope to reduce the scientific uncertainties and recover listed stocks of salmon and steelhead.

Should you require further information, please contact me at (530) 527-3043.

Sincerely,

James G. Smith
Project Leader

Enclosures

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Northern Central Valley Fish and Wildlife *Office*
10950 Tyler Road
Red Bluff, California 96080
Office (530) 527-3043 Fax (530) 529-0292

May 15,2000

Mr. Irwin Fust
Chair, Shasta County Board of Supervisors
1815 Yuba Street, Suite 1
Redding, California 96001

Dear Mr Fust:

The **U.S.** Fish and Wildlife Service is pleased to provide you with copies of four salmon and steelhead monitoring, assessment, and research project proposals we are submitting to the CALFED Bay-Delta Program **for** funding consideration in response to the 2001 Proposal Solicitation Package. The projects that are proposed to he conducted in or near Shasta and Tehama counties are,

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Should you require further information, please contact me at **(530) 527-3043.**

Sincerely,

James ***G.*** Smith
Project Leader

Enclosures

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Northern Central Valley Fish and Wildlife Office
10950 Tyler Road
Red Bluff, California 96080
Office (530) 527-3043 Fax (530) 529-0292

May 15,2000

Mr. George Russell
Chair, Tehama County Board of Supervisors
PO Box 250
Red Bluff, California 96080

Dear Mr. Russell

The U.S. Fish and Wildlife Service is pleased to provide you with copies of four salmon and steelhead monitoring, assessment, and research project proposals we are submitting to the CALFED Bay-Delta Program for funding consideration in response to the 2001 Proposal Solicitation Package. The projects that are proposed to be conducted in or near Tehama and Shasta counties are,

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Should you require further information, please contact me at (530) 527-3043.

Sincerely,

James G. Smith
Project Leader

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Northern Central Valley Fish and Wildlife Office
10950 Tyler Road
Red Bluff, California 96080
Office (530) 527-3043 Fax (530) 529-0292

May 15,2000

Mr: Michael Warren
Redding City Manager
777 Cypress Ave.
Redding, California 960001

Dear Mr. Warren

The U.S. Fish and Wildlife Service is pleased to provide you with copies of four salmon and steelhead monitoring, assessment, and research project proposals we are submitting to the CALFED Bay-Delta Program for funding consideration in response to the 2001 Proposal Solicitation Package. The projects that are proposed to be conducted in or near the City of Redding;

1. Sacramento River winter chinook salmon carcass survey,
2. Battle Creek anadromous salmonid monitoring projects,
3. Clear Creek juvenile salmonid monitoring project,
4. Estimating the abundance of Sacramento River juvenile winter chinook salmon with comparisons to adult escapement.

Prior to conducting any monitoring efforts on private lands, written permission from landowners will be obtained. We have already taken steps to contact local landowners, discuss with them our proposed activities, and ask for permission to conduct these studies on their lands.

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Should you require further information, please contact me at (530) 527-3043.

Sincerely,

James G. Smith
Project Leader

Enclosures